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| Notice of Allowability | Application No. | Applicant(s) | |
| | 10/718,636 | ZHANG ET AL. | |
| | Examiner | Art Unit | |
| | Tung S. Lau | 2863 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 11/25/2005.
2. ☒ The allowed claim(s) is/are 2-14 and 20-33.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Ms. Ingrid Schmidt on Dec. 5, 2005.

The application has been amended as follows:

Replaces claims 1, 2, and amending claims 3, 4, 5, 7, 8, 9, 10, 11, 13, 14, 20 and 24 :

1. (cancelled)
2. (currently amended) ~~A method according to Claim 1 in which~~ A method for monitoring the operation of a continuous caster in a start-up casting mode in which molten metal is shaped in a continuous caster to form a solidifying strand product before the continuous caster reaches a predetermined minimum caster speed, the method including the following steps:
retrieving historical data consisting of multiple historical observations of process variables for a plurality of continuous caster start-up operations, the number of historical observations varying from one continuous caster start-up operation to another;
selecting a modelling set from said historical data to represent normal start-up operations of a continuous caster;
creating a synchronized data set of process trajectories from said modelling set in which the number of historical observations from each continuous caster start-up operation is scaled to correspond to a selected length of strand product;
performing a multi-way principal component analysis (MPCA) on said synchronized data set to calculate the value of principal components T and a loading matrix P for each

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continuous caster start-up operation to develop a multivariate statistical model of normal continuous caster start-up operations;

computing test statistics selected from the group consisting of Squared Prediction Error (SPE) and "Hotelling T" (HT) for each observation from said multivariate statistical model;

selecting control limits for said SPE and HT test statistics and their contributions;

acquiring on-line data consisting of multiple observations of said process variables observed at an elapsed time t during a start-up operation of a continuous caster;

predicting future process trajectories for said on-line data for a start-up operation of the continuous caster producing said selected length of strand product, historical data and on-line data are being selected to correspond to a start-up operation having a casting speed of at least 0.1 meter/second;

applying said multivariate statistical model to a matrix X_{new} of said future process trajectories to compute test statistics selected from the group consisting of Squared Prediction Error (SPE) and "Hotelling T" (HT);

comparing said test statistics computed from the matrix X_{new} to the said control limits; and

generating a detection signal, said detection signal being indicative of whether the continuous caster start-up operation is consistent with normal start-up operations in a continuous caster.

Claim 3, line 1, replace '1' with '2'

Claim 4, line 1, replace '1' with '2'

Claim 5, line 1, replace '1' with '2'

Claim 7, line 1, replace '1' with '2'

Claim 8, line 1, replace '1' with '2'

Claim 9, line 1, replace '1' with '2'

Claim 10, line 1, replace '1' with '2'

Claim 11, line 1, replace '1' with '2'

Claim 13, line 1, replace '1' with '2'

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Claim 14, line 1, replace '1' with '2'

Claim 20, line 6, after 'operations' --which begin with pouring liquid steel into an empty mould and end when a cast length of strand product reaches a pre-determined length--- is added

Claim 24, line 1, replace '1' with '2'

Amendments to claims were made to define over the applied prior art. The additional step of "which begin with pouring liquid steel into an empty mould and end when a cast length of strand product reaches a pre-determined length" now positively claims invention defined in the specification. This system is deemed to be non-obvious over the systems of the prior art.

Allowable Subject Matter

2. Claims 2-14 and 20-33 are allowed.

Reasons for Allowance

3. The following is an examiner's statement of reasons for allowance:

Independent claims 2 and 20 contain allowable subject matter. None of the prior art of record shows or fairly suggests the claimed invention.

Regarding claim 2:

Please see previous office action and applicant's response filed on 11/25/2005 for reason for allowance

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Claims 3-14 and 24-25 are allowed due to their dependency on claim 2.

Regarding claim 20:

The primary reason for the allowance of claim 20 is the inclusion of the method steps of pouring liquid steel into an empty mould and end when a cast length of strand product reaches a pre-determined length. It is these features found in the claim, as they are claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes this claim allowable over the prior art.

Claims 21-23, 26-33 are allowed due to their dependency on claim 20.


Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tung S Lau whose telephone number is 571-272-2274. The examiner can normally be reached on M-F 9-5:30. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on 571-272-2269. The fax phone numbers for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TL


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